

This storm passed about 3 miles south of town but I was within 80 rods from it, and saw how it worked. The main cloud was quite a ways up, while the funnel came down to the ground. It appeared to be about the same size from top to bottom, about 12 feet in diameter and perfectly white. The roar sounded as when a heavy train comes thundering along, *although not a breath of wind was to be felt where I was.*

Other funnel clouds were doubtless observed of which no record has been made.

13th. A few isolated but destructive wind and hail storms were reported as occurring in central and eastern Ohio. Newspaper estimates of the damage at Columbus, Ohio, place the amount at \$10,000.

14th.—Damaging hailstorms occurred in central Connecticut.

16th.—Severe local storms visited central Ohio.

17th and 18th.—Severe local storms occurred on the 17th in Oklahoma, Kansas, Nebraska, and Missouri, passing eastward into adjoining States on the early morning of the 18th without any noticeable decrease in intensity. The blow at Louisville, Ky., was reported by the local press as being the most severe since the memorable tornado of March 27, 1890. Four boys were killed and 5 injured on the farm of the State Asylum for the feeble-minded near Lincoln, Ill. The barn in which the boys had taken shelter was blown down by the gale.

19th.—Severe local storms were experienced in the mountain regions of Pennsylvania.

20th.—A severe local storm in the vicinity of Duncan, Platte County, Neb., caused the destruction of 3 buildings and other smaller structures.

24th.—The hailstorms that occurred in Topeka and Pueblo, Kans., on this date were of extraordinary violence. The size of the stones was carefully determined at both places. Observer Jennings, of Topeka, Kans., describes them in the following words:

While the big hail was falling the observer placed a bucket over his head, and with another bucket ran out and scooped up a dozen balls. With a knife frequently steeped in hot water, these were cut in two and measured, giving the following diameters: One 4.75 inches, one 6.0, one 5.25, one 4.0, one 3.0 one 3.5, one 5.0, one 4.0, one 3.0, one 3.5, one 3.5, one 3.0, one 3.0, giving a mean for the whole lot of 4 inches.

In Topeka 26 people were more or less severely injured by the hail. Much damage was done to roofs, skylights were broken to pieces, and the upper floors damaged by rain. The storm was local, not extending, so far as known, beyond the limits of Shawnee County.

The hailstones that fell in Pueblo were not quite so large as those that fell in Topeka, the largest measuring from 2 to 2.75 inches in diameter and weighing from 4 to 8 ounces. The damage to windows and roofs was not great, since the large hail was confined to a portion of the southern part of the city only. Hail began at Topeka at 7:35 p. m.; at Pueblo, 8:15 p. m., eastern time.

On the same date a tornado was observed north of Culver, Ottawa County, Kans. It moved a little north of east for a distance of 5 or 6 miles, passing and partly demolishing about twenty farm houses. The house of George W. Geesey was totally destroyed, 3 of the inmates killed and 4 severely injured. Property loss about \$3,000.

26th.—Heavy rains and high winds in eastern Kansas and Missouri, also in South Carolina.

27th.—High winds in central Arkansas, accompanied by heavy rain.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperatures and the departures from the normal, as determined from records of the maximum and minimum thermometers, are given in Table I for the regular stations

of the Weather Bureau, which also gives the height of the thermometers above the ground at each station. The mean temperature is given for each station in Table II, for voluntary observers.

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II. The mean temperatures given in Table III for Canadian stations are the simple means of 8 a. m. and 8 p. m. simultaneous observations.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean temperature* of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *highest mean temperatures* were: In the United States, Jacksonville, 83.4; Yuma, 83.0; Phoenix, Port Eads, and Montgomery, 82.6; Key West, 82.2. In Canada, Swift Current and Ottawa, 60.7; Kamloops, 64.4; Winnipeg and Toronto, 60.8; Port Stanley, 60.6; Montreal, 60.3. The *lowest* were: In the United States, Tatoosh Island, 53.7; Sault Ste. Marie, 53.8; Eastport, 54.0; Port Angeles, 54.1; Duluth, 54.2; Marquette, 54.6. In Canada, St. Johns, N. F., 47.2; Grindstone, 49.9; Farther Point, 51.2; Yarmouth, 53.0; Sydney, 53.2; Port Arthur, 54.8; White River, 55.0.

As compared with the normal for June, the mean temperature for the current month was in excess in the South Atlantic and Gulf States and on the north Pacific Coast. It was deficient in the Lake Region, New England, and Maritime Provinces.

The greatest excesses were: In the United States, Jacksonville and Wichita, 3.4; Montgomery, 3.1; Savannah, 3.0; Atlanta, 2.9; Port Eads, 2.7; Augusta, 2.6; Topeka, 2.5; Astoria and Keokuk, 2.1. In Canada (by the means of 8 a. m. and 8 p. m. observations), Swift Current, 2.7; Edmonton, 1.6. The deficits were: In the United States, Sault Ste. Marie, 6.0; Minneapolis and Portland, Me., 4.1; Northfield, 3.7; Duluth and Boston, 3.6; Harrisburg, 3.3. In Canada (for 8 a. m. and 8 p. m., eastern time), St. Johns, N. F., and Montreal, 4.2; Quebec, 3.9; White River, 3.7; Chatham, 2.9.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: South Atlantic, 1.6; east Gulf, 2.1. The greatest negative departures were: New England, 2.5; lower Lake, 2.4; upper Lake, 2.1.

The *years of highest and lowest mean temperatures* for June are shown in Table I of the Review for June, 1894. The mean temperature for the current month was the highest on record at: Jacksonville, 83.4; Montgomery, 82.6; Jupiter, 81.0. It was the lowest on record at: Sault Ste. Marie, 53.8; Marquette, 54.6; Northfield, 57.4; Portland, Me., 58.2; Woods Hole, 60.2; Narragansett Pier, 61.8; Vineyard Haven, 63.0; Albany, 64.6; Harrisburg, 67.2.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: 107, Phoenix (21st); 106, Yuma (frequently); 105, Fresno (30th); 104, Red Bluff (6th). The lowest maxima were: 66, Tatoosh Island (19th); 69, Eureka (11th); 70, Port Angeles (20th) and Eastport (26th); 73, Woods Hole (16th). The highest minima were: 72, Port Eads (5th); 71, Jupiter (frequently);

70, Key West (8th); 69, New Orleans (frequently) and Pensacola (6th); 68, Tampa (10th), Jacksonville (20th), Charleston (9th). The lowest minima were: 31, Idaho Falls (2d) and Marquette (5th); 32, Sault Ste. Marie (7th), Moorhead (frequently), Huron and Williston (6th).

The years of highest maximum and lowest minimum temperatures for June are given in the last four columns of Table I of the REVIEW for June, 1896. During the current month the maximum temperatures were equal to or above the highest on record at: Amarillo, Wichita, and Concordia, 102; Topeka and Savannah, 100; Duluth, 99; Omaha, Keokuk, and Davenport, 98; Kansas City, 97; St. Paul, 94. The minimum temperatures were equal to or below the lowest on record at: Marquette and Idaho Falls, 31; Sault Ste. Marie, 32; Duluth and La Crosse, 33; Green Bay, 34; Grand Haven, 37; Dubuque, 40; Columbia, Mo., 42; Washington, D. C., 43; Wichita, 44; Oklahoma and Springfield, Mo., 46; Kansas City, 48; Memphis, 57.

The greatest daily range of temperature and the data for computing the extreme and mean monthly ranges are given for each of the regular Weather Bureau stations in Table I. The largest values of the greatest daily ranges were: Williston and Idaho Falls, 45; Pueblo, 44; Carson City and Baker City, 41; Miles City, Denver, and Phoenix, 40. The smallest values were: Key West, 13; Hatteras, 14; San Diego, 15; Block Island, Woods Hole, and Corpus Christi, 16; Nantucket and Port Eads, 17; Galveston, Fort Canby, and Tatoosh Island, 18; Eureka, 19.

Among the extreme monthly ranges the largest were: Williston, 69; Moorhead, 64; Bismarck, 62; Carson City and North Platte, 61; Salt Lake City, Huron, and Minneapolis, 60. The smallest values were: San Diego, 16; Key West and Tatoosh Island, 20; Port Eads, Jupiter, and Hatteras, 22.

Accumulated monthly departures from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column, for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
New England.....	+ 3.1	+ 0.5	Ohio Valley and Tenn...	- 1.7	- 0.3
Middle Atlantic.....	+ 0.7	+ 0.1	North Dakota.....	- 5.6	- 0.9
South Atlantic.....	+ 1.1	+ 0.2	Northern Slope.....	- 0.2	0.0
Florida Peninsula.....	+ 1.4	+ 0.2	Southern Slope.....	- 0.6	- 0.1
East Gulf.....	+ 1.1	+ 0.2	Southern Plateau.....	- 4.5	- 0.8
West Gulf.....	+ 5.1	+ 0.8	Middle Plateau.....	- 5.6	- 0.9
Lower Lake.....	+ 1.4	+ 0.2	Middle Pacific.....	- 2.2	- 0.4
Upper Lake.....	+ 6.2	+ 1.0	South Pacific.....	- 3.5	- 0.6
Upper Mississippi Valley..	+ 1.2	+ 0.2			
Missouri Valley.....	+ 0.6	+ 0.1			
Middle Slope.....	+ 2.7	+ 0.4			
Northern Plateau.....	+ 2.0	+ 1.5			
North Pacific.....	+ 0.4	+ 0.1			

MOISTURE.

The quantity of moisture in the atmosphere at any time may be expressed by the weight of the vapor coexisting with the air contained in a cubic foot of space, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-point for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, is given in Table I.

The rate of evaporation from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer. The mean wet-bulb temperature is now published in Table I; it is always intermediate, and

generally about half way between the temperature of the air and of the dew-point. The quantity of water evaporated in a unit of time from the muslin surface may be considered as depending essentially upon the wet-bulb temperature, the dew-point, and the wind.

The relative humidity, or the ratio between the moisture that is present in the air and the moisture that it would contain if saturated at its observed temperature is given in Table I as deduced from the 8 a. m. and 8 p. m. observations. The general average for a whole day or any other interval would properly be obtained from the data given by an evaporimeter, but may also be obtained, approximately, from frequent observations of the relative humidity.

PRECIPITATION.

[In inches and hundredths.]

The distribution of precipitation for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The total precipitation for the current month was largest, exceeding 8 inches in a small portion of western Missouri; it exceeded 6 inches in central New England, central Florida, Georgia, and South Carolina, western Arkansas, and a large portion of Missouri. Little or no rain fell over the southern Plateau Region and southern California.

The larger values for regular stations were: Tampa, 8.46; Kansas City, 7.09; Cairo, 6.87; Concordia, 6.82; Hatteras, 5.76. In Canada, Bermuda, 9.57.

Details as to excessive precipitation are given in Tables XI and XII.

The diurnal variation, as shown by tables of hourly means of the total precipitation, deduced from the self-registering gauges kept at the regular stations of the Weather Bureau, is not now tabulated.

The current departures from the normal precipitation are given in Table I, which shows that precipitation was in excess in parts of Kansas, Missouri, Illinois, Wisconsin, and New England. It was especially deficient on the central Gulf coast, Iowa, and southern Kansas.

The large excesses were: Minneapolis, 5.2; Green Bay, 4.3; St. Paul, 3.8; Havre, 3.4; Cairo and Concordia, 2.4. The large deficits were: Galveston, 4.5; Port Eads, 4.2.

The average departure for each district is given in Table I. By dividing each current precipitation by its respective normal the following corresponding percentages are obtained. (precipitation is in excess when the percentage of the normal exceeds 100):

Above the normal: New England, 107; North Dakota, 118; upper Mississippi, 111; southern Plateau, 179; northern Plateau, 135; north Pacific, 104; middle Pacific, 139.

Below the normal: Middle Atlantic, 78; south Atlantic, 84; Florida Peninsula, 84; east Gulf, 58; west Gulf, 69; Ohio Valley and Tennessee, 74; lower Lake, 75; upper Lake, 92; Missouri Valley, 95; northern Slope, 96; middle and southern Slopes, 94; middle Plateau, 55; south Pacific, 0.00.

In Canada, Professor R. F. Stupart says: "The rainfall has been above the average in British Columbia and over the greater portion of the Northwest Territories, on the higher lands of Ontario, in Prince Edward Island, over the greater part of Nova Scotia and in southern New Brunswick. Excessive rains fell during thunderstorms in Alberta and Assiniboia.

The years of greatest and least precipitation for June are given in the REVIEW for June, 1890. The precipitation for the current month was the greatest on record at: Green Bay, 7.56; Havre, 6.39; Pueblo, 2.13. It was the least on record at: Port Eads, 0.00; Chattanooga, 1.03; Miles City, 1.23; Omaha, 1.43; Nashville, 1.82.